

CLAIMS:

The invention claimed is:

1. A method of forming a patterned photoresist layer over a semiconductor substrate, comprising:

providing a semiconductor substrate having an outer surface;

treating the outer surface with a basic fluid;

applying photoresist onto the outer surface which has been treated with the basic treating fluid; and

patterning and developing the photoresist to form a patterned photoresist layer.

2. The method of claim 1 wherein the outer surface is organic.

3. The method of claim 1 wherein the outer surface is inorganic.

4. The method of claim 1 wherein the outer surface comprises a nitride.

5. The method of claim 4 wherein the nitride comprises silicon nitride.

6. The method of claim 4 wherein the nitride comprises titanium nitride.

7. The method of claim 1 wherein the outer surface comprises silicon dioxide.

8. The method of claim 1 wherein the outer surface comprises silicon carbide.

9. The method of claim 1 wherein the basic treating fluid has a pH of at least 8.5.

10. The method of claim 1 wherein the basic treating fluid has a pH of at least 10.5.

11. The method of claim 1 wherein the basic treating fluid is liquid.

12. The method of claim 1 wherein the basic treating fluid is gaseous.

13. The method of claim 1 wherein the basic treating fluid comprises tetramethyl ammonium hydroxide.

14. The method of claim 1 wherein the basic treating fluid comprises potassium hydroxide.

15. The method of claim 1 wherein the basic treating fluid comprises sodium hydroxide.

16. The method of claim 1 wherein the basic treating fluid comprises ammonium fluoride.

17. The method of claim 1 wherein the basic treating fluid comprises an alkyl amine.

18. The method of claim 1 wherein the basic treating fluid is at room ambient temperature and room ambient pressure during the treating.

19. The method of claim 1 wherein the treating is for no more than 2 minutes.

20. The method of claim 1 wherein the treating is for no more than 1 minute.

21. The method of claim 1 wherein the photoresist is a positive photoresist.

22. The method of claim 1 wherein the photoresist is a negative photoresist.

23. The method of claim 1 wherein the outer surface is not exposed to any liquid intermediate the treating and the applying.

24., The method of claim 1 wherein the outer surface is at least partially dried intermediate the treating and the applying.

25. The method of claim 1 wherein the outer surface is completely dried intermediate the treating and the applying.

26. The method of claim 1 wherein,  
the outer surface is not exposed to any liquid intermediate the treating and the applying; and  
the outer surface is at least partially dried intermediate the treating and the applying.

27. The method of claim 26 wherein the basic treating fluid is liquid.

28. The method of claim 26 wherein the outer surface is completely dried intermediate the treating and the applying.

29. The method of claim 1 wherein the outer surface is reflective of incident radiation used in said patterning of the photoresist.

30., A method of forming a patterned photoresist layer over a semiconductor substrate, comprising:

providing a semiconductor substrate having an outer surface;

treating the outer surface with a basic fluid;

applying a positive photoresist onto the outer surface which has been treated with the basic treating fluid; and

patterning and developing the positive photoresist effective to form a patterned photoresist layer having increased footing at a base region of said layer than would otherwise occur in the absence of said treating the outer surface.

31. The method of claim 30 wherein the outer surface is not exposed to any liquid intermediate the treating and the applying.

32. The method of claim 30 wherein the outer surface is at least partially dried intermediate the treating and the applying.

33. The method of claim 30 wherein the outer surface is completely dried intermediate the treating and the applying.

34. The method of claim 30 wherein,  
the outer surface is not exposed to any liquid intermediate the treating  
and the applying; and

the outer surface is at least partially dried intermediate the treating  
and the applying.

35. The method of claim 34 wherein the basic treating fluid is liquid.

36. The method of claim 34 wherein the outer surface is completely  
dried intermediate the treating and the applying.

37. The method of claim 30 wherein the outer surface is organic.

38. The method of claim 30 wherein the outer surface is inorganic.

39. The method of claim 30 wherein the outer surface comprises a  
nitride.

40. The method of claim 30 wherein the outer surface comprises  
silicon dioxide.

41. The method of claim 30 wherein the outer surface comprises  
silicon carbide.

42. The method of claim 30 wherein the basic treating fluid has a pH of at least 8.5.

43. The method of claim 30 wherein the basic treating fluid has a pH of at least 10.5.

44. The method of claim 30 wherein the basic treating fluid is liquid.

45. The method of claim 30 wherein the basic treating fluid is gaseous.

46. The method of claim 30 wherein the basic treating fluid comprises tetramethyl ammonium hydroxide.

47. The method of claim 30 wherein the basic treating fluid comprises potassium hydroxide.

48. The method of claim 30 wherein the basic treating fluid comprises sodium hydroxide.

49. The method of claim 30 wherein the basic treating fluid comprises ammonium fluoride.

50. The method of claim 30 wherein the basic treating fluid comprises an alkyl amine.

51., The method of claim 30 wherein the basic treating fluid is at room ambient temperature and room ambient pressure during the treating.

52. The method of claim 30 wherein the outer surface is reflective of incident radiation used in said patterning of the photoresist.

53. A method of forming a patterned photoresist layer over a semiconductor substrate, comprising:

providing a semiconductor substrate;

depositing an antireflective coating over the semiconductor substrate,

the antireflective coating having an outer surface;

treating the outer surface with a basic fluid;

applying a positive photoresist onto the outer surface which has been treated with the basic treating fluid; and

patterning and developing the positive photoresist effective to form a patterned photoresist layer having increased footing at a base region of said layer than would otherwise occur in the absence of said treating the outer surface.

54. The method of claim 53 wherein the outer surface is not exposed to any liquid intermediate the treating and the applying.

55. The method of claim 53 wherein the outer surface is at least partially dried intermediate the treating and the applying.



56. The method of claim 53 wherein the outer surface is completely dried intermediate the treating and the applying.

57. The method of claim 53 wherein,  
the outer surface is not exposed to any liquid intermediate the treating and the applying; and

the outer surface is at least partially dried intermediate the treating and the applying.

58. The method of claim 57 wherein the basic treating fluid is liquid.

59. The method of claim 57 wherein the outer surface is completely dried intermediate the treating and the applying.

60. The method of claim 53 wherein the outer surface is organic.

61. The method of claim 53 wherein the outer surface is inorganic.

62. The method of claim 53 wherein the basic treating fluid has a pH of at least 8.5.

63. The method of claim 53 wherein the basic treating fluid has a pH of at least 10.5.

64. The method of claim 53 wherein the basic treating fluid is liquid.

65. The method of claim 53 wherein the basic treating fluid is gaseous.

66. The method of claim 53 wherein the basic treating fluid comprises tetramethyl ammonium hydroxide.

67. The method of claim 53 wherein the basic treating fluid comprises potassium hydroxide.

68. The method of claim 53 wherein the basic treating fluid comprises sodium hydroxide.

69. The method of claim 53 wherein the basic treating fluid comprises ammonium fluoride.

70. The method of claim 53 wherein the basic treating fluid comprises an alkyl amine.

71. The method of claim 53 wherein the basic treating fluid is at room ambient temperature and room ambient pressure during the treating.